

REMARKS

Claims 1-19, 21, 23-54, 57-81, and 83-104, are presently pending in this application. Claims 20, 22, 55, 56, 82, and 168-172 have been canceled, and Claims 105-167 have been withdrawn from consideration as being directed to a non-elected invention. Reconsideration and allowance of all claims are respectfully requested in view of the following remarks.

The Examiner has objected to Claim 75 due to a grammatical error. Claim 75 has been amended to correct for the grammatical error.

The Examiner has objected to Claims 93, 94, 102, and 103, under 35 U.S.C. §112, second paragraph, as being indefinite. The claims have been amended to ensure that the claims are definite.

In particular, Claim 93 has been amended to clarify that the position of the probe trap is altered by changing the discrete non-homogenous region of the static surface receiving the beamlet of light for another discrete non-homogenous region. Further, Claim 94 has been amended to recite that the non-homogenous regions of the static surface are continuously varied. As stated on page 10, line 10 *et. seq.*, the fixed surface 41 which contains one or more fixed regions 42-46, may be moved to select an appropriate region.

The Applicants submit that these amendments are not narrowing amendments or related to patentability, as defined by the Supreme Court in Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., Ltd., et al., on May 28, 2002 (2002 U.S. LEXIS 3818), but rather, are simply for reasons of clarity and proper form.

The Examiner has rejected Claims 1-19, 21, 23-54, 57-81, 83-89, 104, 168-170, and 172 under 35 U.S.C. §102(b) as being anticipated by Ulmer et al. The Examiner has rejected Claims 90-104 and 171 under 35 U.S.C. §103 as being unpatentable over Ulmer et al. in view of Grier et al.

Claims 20, 22, 55, 56, 82, and 168-172 have been canceled. For the following reasons, the prior art rejections are respectfully traversed.

The Applicants respectfully submit that Ulmer et al. do not teach or suggest a method of forming a configurable array of probes including generating a plurality of movable optical traps simultaneously

within a vessel; selecting at least said two probes for inclusion in a communal diffusional spatial array based on said known binding and reactivity characteristics of the probes; containing each of the selected probes with one of said optical traps to form the array; and selectively tracking at least one of the two probes using said one of the optical traps which contains said one probe, as recited in amended Claim 1, and substantially as recited in Claims 23, 57, 63, 89, and 104.

Rather, Ulmer et al. disclose a conventional optical trap 10 (see col. 2, lines 19-21), where the optical trap is used to trap a particle in one region of a heterogeneous thin liquid film coating, and move the particle through a succession of different regions of the thin film coating where different chemical, biological, and/or biochemical processes take place (see col. 4, lines 15-19).

In one embodiment of Ulmer et al., a single bead is selected by the optical trap from the droplet containing the beads, and by moving the optical trap relative to the thin film, the trapped bead is then moved through the thin film to a droplet containing nucleotides of the type that is next to be coupled to the nucleotide already attached to the bead (see col. 5, lines 25-33).

In yet another conventional procedure described in Ulmer et al., a probe is coupled to a particle suitable for trapping in an optical trap. One or more of the particle-coupled probes are then applied to thin film 110 in a first droplet 112. The optical trap is then used to select one of the particle-coupled probes in its optical beam and move the particle-coupled probe through thin film 110 into the second droplet 114 (see col. 7, lines 28-36).

However, Ulmer et al. are silent with respect to generating a plurality of movable optical traps simultaneously. Instead, Ulmer et al. disclose trapping a single particle or a single bead from a droplet, or selecting a single particle-coupled probe, one at a time, and moving the particle, bead, or probe in sequence to different positions for interaction with different chemicals.

Further, Ulmer et al. fail to disclose trapping the at least two probes in a communal diffusional spatial array, but rather, disclose only a conventional two-dimensional configuration which discloses probes attached to the planar surface of a solid support or substrate (see pages 1-3 of the Background of the Invention section of the present specification).

Further, in Ulmer et al., the bead, particle, or particle-coupled probe is moved from place to place. However, in the present invention, the probes are organized in a communal diffusional spatial array, and a pattern can be made in a communal diffusional spatial array (i.e., three spatial dimensions) with the probes, and not just in one plane as in Ulmer et al.

Further, as stated in pages 1-3 of the Background of the Invention section of the present specification, one drawback is that the two-dimensional configuration provides a limited surface area to which probes can be attached, thereby setting a limit on the density of the probes to assay for the targets. Another drawback is the required physical attachment of the probe to the substrate.

Additionally, Ulmer et al. are silent with respect to selecting probes based on known binding and reactivity characteristics.

However, in the present invention, at least two probes are selected for inclusion in a communal diffusional spatial array based on the known binding and reactivity characteristics of the probes, and the selected probes are contained with one of the optical traps to form the array.

Further, at least one of the two probes is selectively tracked using one of the optical traps which contains the one probe. In contrast, in Ulmer et al., the trapping of the particles is performed one at a time, in parallel (see col. 12, lines 37-53).

Thus, in the present invention, with the use of a communal diffusional spatial array, multiple probes can be generated and moved by the optical traps simultaneously and independently. However, as stated above, Ulmer et al. disclose trapping of the particles in parallel, in a single plane, which leads to having to repeat the disclosed sequences over and over again (see Ulmer et al., col. 12, lines 37-53).

According, Claims 1, 23, 57, 63, 89, and 104, are not anticipated by (nor obvious over) Ulmer et al., and the rejection of Claims 1, 23, 57, 63, 89, and 104, under 35 U.S.C. §102(b) should be withdrawn.

Further, since Claims 2-19, 21, 24, 26, 27, 30, 40, and 42-44 depend from Claim 1; Claims 25, 28, 29, 31-39, 41, and 45-54, depend from Claim 23; Claims 58-62 depend from Claim 57; Claims 64-81, 83-87 depend from Claim 63; Claims 91-101 depend from Claim 90; they are also patentably

distinguishable over Ulmer et al. for the reasons cited above with respect to Claims 1, 23, 57, 63, 89, and 104.

With respect to Claims 90 and 104, the Applicants respectfully submit that neither the individual nor the combination of the Ulmer et al. and the Grier et al. references teaches or suggests a method of forming a configurable array of probes including passing the beamlets through the focusing lens and converging the beamlets to simultaneously generate a plurality of movable optical traps within the vessel; selecting at least two probes for inclusion in a communal diffusional spatial array based on said known binding and reactivity characteristic of the probes; and containing each of the selected probes with one of the optical traps.

Further, neither the individual nor the combination of the Ulmer et al. and Grier et al. references teaches or suggests illuminating the biological material with a source suitable for spectral measurement; measuring the spectrum of the biological material; using the spectral measurement to select the biological material to use as at least one biological probe in a communal diffusional spatial array; nor containing at least one of the selected biological probes with one of the optical traps, as additionally recited in Claim 104.

As stated above, Ulmer et al. are silent with respect to generating a plurality of movable optical traps simultaneously, and trapping the at least two probes in a communal diffusional spatial array. Further, as stated above, Ulmer et al. are silent with respect to selecting probes based on known binding and reactivity characteristics, and on the basis of their spectral measurement.

The addition of the Grier et al. reference does not make up for the deficiencies in Ulmer et al.

First, Grier et al. is not directly related to the claims of the present invention, and disclose optical tweezers which can trap silica spheres in three dimensions (see page 3, Background of the Invention section of the present specification and col. 6, lines 1-13). However, Grier et al. do not teach or suggest the claims of the present invention, such as configuring probes into a communal diffusional spatial array based on the known binding and reactivity characteristic of the probes; nor illuminating the biological material with a source suitable for spectral measurement; measuring the spectrum of the biological

spectrum of the biological material; and using the spectral measurement to select the biological material to use as at least one biological probe in a communal diffusional spatial array.

Rather, Grier et al., disclose a method of optical trapping silica spheres, and Grier et al. are silent with respect to configuring probes into a communal diffusional spatial array based on the known binding and reactivity characteristics of the probes, and using spectral measurements to select a biological probe.

Although the Examiner alleges that it is obvious to combine the references, one of ordinary skill in the art would not have combined Ulmer et al. with Grier et al. to achieve the claimed features of the present invention.

Rather, the combination would be unworkable because Ulmer et al. disclose only using optical traps in a two dimensional manner to identify and isolate desired DNA fragments, or perform DNA sequencing, by trapping a particle and moving it in a planar manner within a thin film. Since Grier et al. disclose three-dimensional arrays, it is not known how moving a particle in a thin film can be accomplished without abandoning the concept of Ulmer et al.

In fact, each reference is complete in itself and the combination does not add any additional advantages from one to another. In fact, neither reference is directed to the concept of the present invention, as defined in the claims, of optically trapping a probe, and exposing it to a target biological material in a vessel. Thus, there is no motivation to combine the Ulmer et al. and Grier et al. references to achieve the claimed features of the present invention, and the Examiner has failed to prove a *prima facie* case of obviousness.

Still further, Ulmer et al. is directed to scanned optical tweezers, which are different from the holographic tweezers of Grier et al. In the scanned optical tweezers of Ulmer et al., there is one beam of light to one optical trap, and if it is scanned fast enough, several particles can be trapped simultaneously (see Ulmer et al., col. 12, lines 37-53). However, only one trap at a time is lit up.

In contrast, Grier et al. utilize holographic optical tweezers where each beam is lit up all the time on each of the multiple optical traps. There is no scanning being performed in the same sense as Ulmer et al.

In contrast, Grier et al. utilize holographic optical tweezes where each beam is lit up all the time on each of the multiple optical traps. There is no scanning being performed in the same sense as Ulmer et al.

Accordingly, Claims 90 and 104 are not obvious over either the individual or the combination of the Ulmer et al. and Grier et al. references, and the rejection of Claims 90 and 104 under 35 U.S.C. §103 should be withdrawn.

Further, since Claims 91-103 depend from Claim 90, they are also patentably distinguishable over either the individual or the combination of the Ulmer et al and Grier et al. references for the reasons cited above with respect to Claim 90.

If the Examiner believes that there is any issue which could be resolved by a telephone or personal interview, the Examiner is respectfully requested to contact the undersigned attorney at the telephone number listed below.

Applicants hereby petition for any extension of time which may be required to maintain the pendency of this case, and any required fee for such an extension is to be charged to Deposit Account No. 19-3140.

Respectfully submitted,

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